(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) **International Patent Classification**[7]: **G06F**

(21) **International Application Number:** PCT/US00/13128

(22) **International Filing Date:** 12 May 2000 (12.05.2000)

(25) **Filing Language:** English

(26) **Publication Language:** English

(30) **Priority Data:**
60/133,840   12 May 1999 (12.05.1999)   US
60/133,848   12 May 1999 (12.05.1999)   US

(71) **Applicant** *(for all designated States except US)*: **FRAUN-HOFER CRCG, INC.** [US/US]; 321 S. Main Street, Suite 2, Providence, RI 02093 (US).

(72) **Inventors; and**
(75) **Inventors/Applicants** *(for US only)*: **LUO, Chenghui**

[CN/US]; 702 Greenville Avenue, Johnston, RI 02909 (US). **ZHAO, Jian** [CN/US]; 130 New Road, Rumford, RI 02916 (US).

(74) **Agent: NELSON, Gordon, E.;** 57 Central St., P.O. Box 782, Rowley, MA 01969 (US).

(81) **Designated State** *(national)*: US.

(84) **Designated States** *(regional)*: European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published:
— *Without international search report and to be republished upon receipt of that report.*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

---

(54) **Title: OBFUSCATION OF EXECUTABLE CODE**

(57) **Abstract:** Three new obfuscation techniques. Data field obfuscation replaces references to data fields that use an object name and a field name with references that use an object name but do not use a field name. Obfuscation using the reflection mechanism for the executable code works by replacing a construct in the executable code with one or more equivalent constructs made using the reflection mechanism. Obfuscation of externally-defined constructs is done by relating the externally-defined construct to an obfuscation for the construct that is used within the executable code. The relationship is defined in a portion of the executable code, and at least the externally-defined construct is encrypted in the portion. The various obfuscation techniques may be used with each other or with other previously-known obfuscation techniques. The disclosed obfuscation techniques are particularly well-adapted for use with the byte codes produced by Java language compilers from Java language programs.